

Impact of Menu Labeling on Food Choices of Southern Undergraduate Students

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Abstract

Americans consume more meals away from home at fast-food and dine-in restaurants. The restaurant foods are notorious for their energy density and large portion sizes. The objective of our study was to determine whether or not the addition of calorie information to a restaurant menu affects the calorie content of meals ordered by college students. Study participants were selected from a random sample of 1,025 undergraduate students (≥ 18 years old). Data analyses included descriptive statistics and both paired-samples and independent-samples *t*-tests. Our data analysis found a significant difference between the number of calories chosen from the first menu (without calorie labels) versus the second menu (with calorie labels) ($p=0.001$, 2-tailed). Analysis also showed that there was no significant difference in calories ordered from the first menu versus the second menu for those who had taken a college-level nutrition class and those who had not ($p=0.051$, 2-tailed). Our findings suggest that menu calorie labels can positively affect college students' meal selections making them lower in calories; however, no particular group of students was more likely than any other to change their menu selections after seeing the calorie labels. Further research is needed to determine if use of calorie labels will decrease the number of calories ordered at fast-food and dine-in restaurants among other populations.

Keywords: Menu labeling; Nutrition information; Calorie labeling; Fast-food; Restaurant; College students

Abbreviations: CDC: Centers for Disease Control and Prevention; BMI: Body Mass Index; NLEA: Nutrition Labeling and Education Act; IRB: Institutional Review Board; UAMS: University of Arkansas for Medical Sciences; SPSS: Statistical Package for the Social Sciences

Introduction

The rate of overweight and obesity has drastically increased over the past two decades. Recent obesity statistics from the National Health and Nutrition Examination Survey (NHANES) captured by the Centers for Disease Control and Prevention (CDC) in 2009-2010 indicate that approximately 68.8% of American adults are either overweight or obese, with 35.7% of them being obese [1]. As the rate of overweight and obesity continues to rise steadily with no end in sight, the government is charged with the task of devising strategies to hamper the epidemic. With the passage of the Nutrition Labeling and Education Act (NLEA) in 1990, all foods purchased in stores were required to list nutrition information on the packages in a standard format—a law implemented for the purpose of creating informed consumers who make healthier choices based on their knowledge of the nutritional content of the foods on store shelves [2]. This law, however, did not have the anticipated impact on overweight and obesity rates—partially because Americans are consuming more and more meals away from home at fast-food and dine-in restaurants [3].

The term “menu labeling” refers to the listing of nutrition information next to each food item on restaurant menus, menu boards, and drive-through menu boards so it can be viewed and considered by customers when making their food selections [4]. According to the Patient Protection and Affordable Care Act of 2010, Section 4205, restaurant chains with 20 or more establishments of the same name will be required to disclose nutrition information for their menu items on the menu or menu board [5]. This nutrition information, at minimum, must include calories [5] but can list further information including, but not limited to, total fat, saturated fat, carbohydrates, sodium, protein, and fiber. If not disclosed on the menu, the additional nutrition information beyond calories must be made available to customers in written form upon request [6]. In addition to the calorie labels, menus

must also contain a statement specifying the recommended daily caloric intake for one day for the average American—2000 calories—enabling customers to put the calorie labels of individual food items into context of a total daily caloric intake [5].

Restaurant foods are notorious for their energy density and large portion sizes—undoubtedly contributing to the undesirable weight status of a majority of Americans. Studies show that on average, foods prepared and eaten outside the home consist of large portion sizes and have high energy density with little nutritional value and low satiating power [7,8].

Some chain restaurants currently offer nutrition information in the form of tray liners, pamphlets, posters, charts, on-site computers [9,10] or on food containers or napkins, depending on the restaurant. Most restaurants offer the information online, but not necessarily at the point-of-service [11].

Research has shown the difficulty of estimating the number of calories and other determinants of nutritional quality in restaurant foods based on seeing the food alone. Studies demonstrate that the lay consumer significantly underestimates calories, fat, and saturated fat in restaurant meals [12-17]. Only 15% of consumers in New York City were correctly able to estimate (within 100 calories) the number of calories in their fast-food meal. Results from Burton et al. revealed an average of 900 extra calories per week were being unintentionally consumed by participants who continually underestimated the calories in their restaurant meals—an amount likely capable of causing

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weight gain over time [13]. One study pointed out that the result of a consumer underestimating a meal by 600 calories only once per week leads to an added intake of approximately 30,000 calories in one year, which equals approximately 9 pounds of body fat if all other factors (i.e. physical activity) remain the same [16].

Several studies have investigated the effectiveness of the law in states and localities where menu labeling is already in place as well as the anticipated effects of the menu calorie labels that will soon be required nationally. Various methods have been utilized to collect the data with results spread across the board. Studies have shown that the majority of consumers support the menu labels [18-21]; however, whether or not they will actually use them to decrease the caloric content of their restaurant meals is more controversial.

Studies conducted in college dining halls have had generally consistent results—a moderate number of college students want nutrition information available and/or use posted nutrition information to make lower-calorie meal selections [22-26]. One study reported two-thirds of the freshman respondents were aware of the food labels in the dining hall, while one-third actually used them to make meal selections (actual change in calories purchased was not measured) [23]. This study, like others [27,28], demonstrated a greater female than male use of food labels. Another study in a Mid-western college dining hall tested the implementation of fat labels rather than calorie labels, with a resulting reduction of 16.4% in the amount of fat purchased [24]. In another Mid-western college dining hall, 80% reported “sometimes” changing their ordering habits and 12% reported “nearly always” changing their ordering habits based on “Nutrition Bytes” food labels displayed in the dining hall [25]. However, a two-week study of British college students who dined in a campus cafeteria demonstrated that the food labels displayed in week two of the study had no positive effect on menu ordering when compared to week one (no food labels), and actually had a negative effect on both males and unrestrained eaters who actually consumed more calories in week two [29].

Few studies on menu calorie labeling have been done using college students in the southern region; therefore, the objective of this study was to measure the potential effectiveness of calorie labeling among college students.

Materials and Methods

Experimental design

Study participants were undergraduate college students. Inclusion criteria included age ≥ 18 years and current enrollment status. A link to a web-based survey on Survey Monkey (an online survey program; Menlo Park, California) was sent with a brief informational email regarding the study to a random sample of 1,025 students. This study was approved by the Institutional Review Boards (IRB) at both the University of Arkansas for Medical Sciences (UAMS) and the college from which students were recruited. The investigator had no access to names or other individual identifiers; all participants remained completely anonymous. The survey remained open for two weeks. Informed consent was obtained electronically at the beginning of the survey.

The survey contained two fast-food sandwich restaurant menus along with two sets of instructions—one set immediately before viewing the first menu and a second set before viewing the second menu. The first menu viewed by the participants was a regular menu containing sandwich, side dish, and beverage selections from which students were instructed to make selections as if they were actually dining at

that restaurant. After each sandwich name, a description was included (e.g. Turkey Breast: wheat bread, turkey, vegetables of choice). Each sandwich was offered in either 6-inch or 12-inch size, with two or three additional options for each size (e.g. plain, with cheese, and/or with cheese and mayo). After making selections from the first menu, students were instructed to make selections from a second menu that was identical to the first with the addition of calorie information next to each menu option. The second menu also contained a calorie claim stating, “The recommended daily caloric intake for an average adult is 2,000 calories; individual needs may vary.” Nutrition information and sandwich descriptions for sandwiches, side dishes, and beverages were based on the nutrition information provided on Subway’s corporate website [30].

Following meal selections from both menus, students were instructed to complete a survey pertaining to the menus and the selections they made. Survey questions were developed independently after reviewing current research. The survey consisted of 18 questions—nine yes/no, one ranking, one Likert scale [31,32], three multiple choice, and four demographic questions.

Content validity for both survey and accompanying menus was established using face validity field testing. After development of the online survey, the link to the survey was emailed to the field test participants along with instructions for completing the field test. Field test participants provided feedback on the menus, survey questions, and clarity of the instructions for completion of the survey. Feedback from the field test was used for survey revision. The field test participants where not eligible for the actual study.

Statistical analysis

A paired-samples *t*-test was conducted to evaluate the calorie content of the meal choices from the first menu versus the second menu. Further analysis using independent-samples *t*-tests was conducted to measure difference in calories ordered versus both age group and college major. Another independent *t*-samples *t*-test was used to evaluate the difference in calories ordered from the first menu versus the second menu and whether or not the respondent had taken a college-level nutrition class. Descriptive statistics were used to quantify the frequency of fast-food consumption, whether respondents would use the calorie information for meal selection if it were available on restaurant menus, the change(s) made by those who chose differently on the second menu, as well as age, gender, race/ethnicity, college major, etc. Means were compared to determine the order of importance of four factors involved in making food selections at restaurants. The software used to analyze the data was Statistical Package for the Social Sciences (SPSS) Student Version 20 (SPSS Inc., Chicago, Illinois). A significance level of $P < 0.05$ was used to determine whether to accept or reject the null hypotheses.

Results

Descriptive statistics included age, race/ethnicity, gender, college major, and whether or not the student had taken a college-level nutrition class. Of the 1,025 students who received the invitational e-mail, 70 responded and 91% of those students completed the entire survey ($n=64$). The responses from the six students who did not complete the entire survey were excluded from the analysis. The mean age ($n=64$) was 28.65 (range=18-61 years old), with 56% falling in the 18-24 and 44% in the ≥ 25 year old age groups. Two age groups were formed in order to compare traditional (18-24 year old) versus non-traditional (≥ 25 year old) college students’ attitudes toward menu

labeling. Female respondents made up 80% (n=51) while the male response rate was 20% (n=13). Health and behavioral sciences majors totaled 45% (n=29) followed by 19% business, 11% undecided/other, 8% science/mathematics, 8% education, 6% liberal arts, and 3% fine arts/communication. This demographic information is presented in table 1.

The majority of respondents, 53% (n=34), ate at fast-food restaurants 0-1 time per week, 42% (n=27) 2-3 times per week, and 2% (n=1) in each of the remaining categories of 4-5, 6-7, and > 7 times per week (Table 1) (Chart 1). Fifty-three percent (n=34) strongly agreed that they would use nutrition information to make menu selections if it was provided on restaurant menus; thirty percent (n=19) agreed, 6% (n=4) disagreed, 6% (n=4) strongly disagreed, and 5% (n=3) were undecided on this question (Table 2; Chart 2).

A paired-samples *t*-test was used to compare calories chosen from the first menu (without calorie labels) versus calories chosen from the second menu (with calorie labels). Of those who completed the survey, 44% (n=28) correctly completed the menu selection portion of the survey. The remaining respondents (n=36) did not correctly complete the menu selection portion of the survey and were excluded from this portion of the data analysis. There was a statistically significant difference ($p < 0.001$) in calories chosen from the first menu ($M \pm SD$, 678.39 ± 303.35) that did not contain calorie information versus the second menu (515.00 ± 203.47) that did contain calorie information resulting in less calories chosen when the calorie information was present (Table 3; Chart 3).

An independent samples *t*-test was performed to compare calories chosen between the two age groups. There was no significant difference

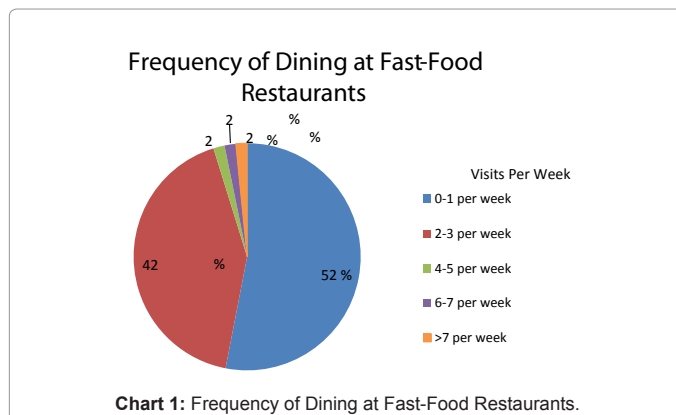


Chart 1: Frequency of Dining at Fast-Food Restaurants.

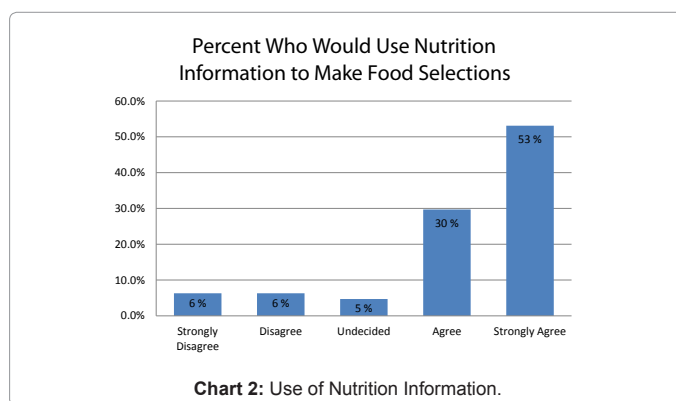


Chart 2: Use of Nutrition Information.

Demographic Characteristics of the Study Sample	
Demographic Variable	Percent Respondents*
Age (n=63)	
18-24	56
25+	44
Race/Ethnicity (n=64)	
White, non-Hispanic	80
Black or African American	12
White, Hispanic	3
American Indian or Alaska Native	3
Asian	2
Gender (n=64)	
Female	80
Male	20
College Major (n=64)	
Health and Behavioral Sciences	45
Business	19
Undecided/Other	11
Science/Mathematics	8
Education	8
Liberal Arts	6
Fine Arts/Communication	3
Taken a College-Level Nutrition Class (n=64)	
Yes	53
No	47
How many times per week do you eat at a fast-food restaurant? (n=64)	
0-1	53
2-3	42
4-5	2
6-7	1
>7	2

*Percent reported for each demographic variable are rounded to the nearest percent

Table 1: Demographic Characteristics.

If nutrition information was provided for foods on restaurant menus, I would use that information to make food selections. (n=64)	
Answer Options	Percent Respondents*
Strongly Agree	53
Agree	30
Undecided	5
Disagree	6
Strongly Disagree	6

*Percent reported for each demographic variable are rounded to the nearest percent.

Table 2: Use of Nutrition Information.

in calorie chosen for students 18-24 years ($M \pm SD$, -171.67 ± 277.58) and students >25 years ($M \pm SD$, -157.19 ± 211.98) $t(26) = -157$, $p = 0.877$. A second independent-samples *t*-test was performed to evaluate the difference in calories chosen versus college major. Similarly, no significant difference in calories was chosen by health and behavioral sciences majors ($M \pm SD$, -84.23 ± 137.38) and all other majors ($M \pm SD$, -232 ± 285.91), $t(20.74) = 1.779$, $p = 0.09$. The results of these *t*-tests are summarized in table 4 and charts 4 and 5.

Discussion

In this study, 83% of respondents either agreed or strongly agreed that they would use nutrition information to make food selections if it was provided on restaurant menus (Table 2; Chart 2). In support of our study, other investigators have reported similar findings backing menu labeling [22-24,27,33-35]; one of those studies reported findings similar to those in this study with 90% of the respondents reporting they would use nutrition information if it was available on restaurant menus [33].

Our results show a significant difference ($p < 0.001$) between

Paired-Samples T-Test						
Pair	n	Mean Calories	SD	t	df	p (2-tailed)
Calories Menu 1	28	678.39	303.35	3.64	27	.001*
Calories Menu 2	28	515.00	203.47			

Table 3: Paired-Samples T-Test-difference in calories selected.

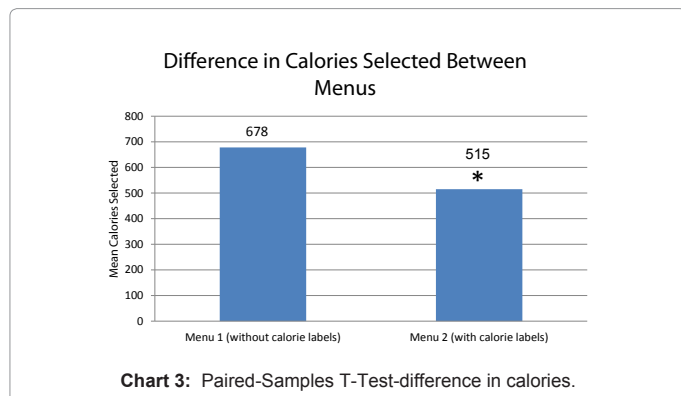


Chart 3: Paired-Samples T-Test-difference in calories.

Independent-Samples T-Tests						
Test 1						
Age Group	n	Mean Difference in Calories	SD	t	df	p (2-tailed)
18-24	12	-171.67	277.58	-.157*	26	.877
25+	16	-157.19	211.98			
Test 2						
College Major	n	Mean Difference in Calories	SD	t	df	p (2-tailed)
Health and Behavioral Sciences	13	-84.23	137.38	1.779**	20.74	.09
All other majors	15	-232.00	285.91			

Table 4: Independent-Samples T-tests.

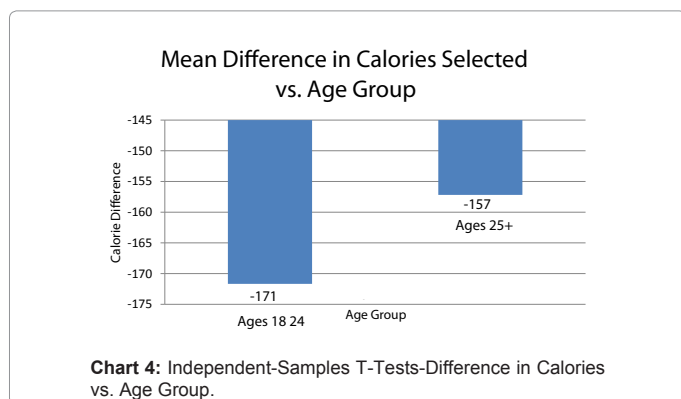


Chart 4: Independent-Samples T-Tests-Difference in Calories vs. Age Group.

calories selected for one full meal from a menu without calories versus a menu with calories; less calories were chosen when the menu labels were present on the menu (Table 3; Chart 3). Additionally, our results show that 57% (n=16) of respondents changed the number of calories ordered after seeing the menu that contained calorie labels, which is consistent with the main intent of the menu labeling legislation. Although three of these respondents stated they made no changes after viewing the calorie labels, they actually did make changes to their menu selections (two decreased while one increased the caloric content of their second meal selections); these respondents were included in the data analysis. Our significant results are similar to those from eight

other studies [24,25,36-39] including Yamamoto et al., which showed 29% of the study sample changed their order after viewing the calorie-labeled menus [39]; however, only 46% of those meals resulted in a decreased caloric content whereas, in this study, 93.8% (n=15) of the meals that were changed (n=16) resulted in a decreased caloric content.

In a similar study, students in a college dining hall decreased the caloric content of their meal selections when calorie labels were displayed and began increasing the caloric content soon after calorie labels were removed [26]. Previous studies where 9% and 14.5% of participants used calorie labels to make ordering decisions showed no significant overall difference in calories purchased after viewing menu labels [40,41]. Studies conducted in localities where menu labeling has already taken effect also demonstrated no change in calories ordered as a result of the calorie labels [42,43]. The calorie-labeled menu in this study also contained a calorie claim at the top stating, "The recommended daily caloric intake for an average adult is 2,000 calories; individual needs may vary." Roberto et al. specifically reports a positive impact of including a similar claim on menus used in that study [37]. This claim will be included on chain restaurant menus as part of the menu labeling legislation soon to take effect.

One interesting finding of our study is that 64% of respondents stated that they automatically assumed sandwich restaurants were healthier than other types of fast-food restaurants (Table 5), a phenomenon that has been termed the "health halos" of restaurant foods. Additionally, 75% of respondents stated they were surprised by how many calories at least one of the menu options contained (Table 5). Our results are analogous to results from studies designed around "health halos" that report consumers underestimate calories more if they are from restaurants deemed "healthy" (e.g. sandwich restaurants

Questions Related to "Health Halos"	
Survey Question	Percent Respondents*
I automatically assume that sandwich restaurants are a healthier option than other types of fast-food restaurants.	
(n=64)	
Yes	64
No	36
I was surprised by how many calories at least one of the menu options contained.	
(n=64)	
Yes	75
No	25

*Percent reported for each demographic variable are rounded to the nearest percent.

Table 5: "Health Halos".

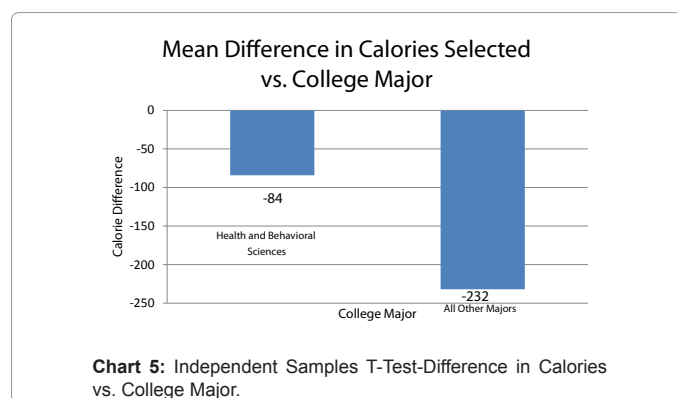


Chart 5: Independent Samples T-Test-Difference in Calories vs. College Major.

similar to the one used for menu selections in this study) or foods containing a “healthy” or “low-fat” label [17,44,45].

Conclusion

Based on our review of the literature, this is the first study on menu labeling that has targeted college students in this region of the country. Our significant results demonstrating the effectiveness of menu labeling by encouraging students to order a lower-calorie meal are promising for the overall success of the legislation. One limitation of this study was the small initial response rate (n=70) and eligible sample size of those who completed the entire survey (n=64). Further, 56% of respondents had to be excluded for a portion of the data analysis due to incorrect completion of the menu selection portion of the survey. This likely occurred from misunderstanding or overlooking the directions that appeared prior to selection of meals from both the first and second menus. Although a field test was conducted to validate the survey utilized in this study, the method proved somewhat ineffective in this case and resulted in a decreased sample size for some of the analysis.

Further research is needed to compare whether different populations in the southern region would use the calorie labels to decrease the number of calories ordered in fast-food and other types of restaurant meals. The target population in this study was college students; however, it is likely that different populations (high school students, city residents, rural area residents, etc.) would have different attitudes and knowledge about calories and their health and would make their menu selections accordingly. After menu labeling is implemented nationwide, research will need to be conducted to determine whether or not patrons are actually using the labels to choose and consume lower-calorie meals.

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